

## Science of Synthesis as a Teaching Resource: Useful Links

Science of Synthesis (SOS) is your online tool for comprehensive and quality organic synthesis reviews for the most reliable chemical transformations available. It is the only resource available containing methods with full-text reviews by experts, experimental procedures and accurate and detailed reaction schemes. For more information about Science of Synthesis [click here](#).

sos.thieme.com

In addition to its application as a tool to aid synthetic chemistry research, we would like to highlight how the authored content of Science of Synthesis can also be useful in an educational context. We have collected together some direct links to Science of Synthesis chapters that are useful as a resource for the preparation and teaching of advanced organic chemistry courses. The articles by expert chemists on particular topics (e.g., types of transformation, named reactions) can be used as a reference resource when preparing course material. They also serve as an excellent starting point for students for further reading around a topic. Furthermore, Science of Synthesis is a useful resource to students who are assigned coursework such as compiling a literature review on an area of synthetic organic chemistry, or when writing an introduction to a thesis.

- The chapters denoted with a \* are those which the editorial office feel might be particularly useful from a teaching perspective. This generally means that there is a broad coverage of the topic in question, and this is often supplemented in the discussion text with significant details of aspects such as mechanisms, selectivity, scope/limitations, practical examples, etc.
- A significant advantage of Science of Synthesis is the ability to put a particular method in context with related methods/approaches to the one being viewed. Clicking on the “**Explore Contents**” tab at any time will show the location of the article you are reading in the unique organized hierarchy of Science of Synthesis, and this can help students put a particular process in context. e.g., Which metals other than manganese (Jacobsen epoxidation) have been used to catalyze alkene epoxidations.
- The content serves as a quick and easy resource for both tutors and students to organize and access the key original articles from the literature on a particular topic. The reference list at the bottom of each section of content links directly through to the original literature.
- We are often complimented on the clarity of the schemes and figures in Science of Synthesis; although there is currently no tool for downloading these, if you would like to be supplied with the original drawings for any particular chapter to aid with the preparation of course materials, then please just get in touch with the editorial office ([SOS\\_techsupport@thieme.com](mailto:SOS_techsupport@thieme.com)).
- Note that it is possible to download and save entire chapters by clicking on the “Download PDF” icon found at the top right of any content page.

You can also save/print the “page” currently being viewed using the neighboring printer icon.

The screenshot shows the Science of Synthesis website interface. At the top, there are two tabs: "Explore Contents" and "Training & Support". On the right side, there is a "Download PDF" button and a "MysOS" logo. Below the tabs, the main content area displays the title "3.7.1 The Claisen Rearrangement" in blue. Underneath the title, the DOI is listed as "10.1055/sos-SD-203-00213". There are navigation arrows (back and forward) to the right of the DOI. Below the DOI, the author information is given as "Zeh, J.; Hiersemann, M., *Science of Synthesis: Stereoselective Synthesis*, (2011) 3, 347." The main text of the page begins with "The [3,3]-sigmatropic rearrangement of allyl vinyl ethers to form  $\gamma,\delta$ -unsaturated carbonyl compounds is known as the Claisen rearrangement. This reaction was named after its discoverer Ludwig Claisen (1851–1930), who".

**NOTE:** If you think your institution subscribes to SOS but you do not have full access through to these links (e.g., because of accessing remotely), please try using your institution's VPN or contact your librarian for further assistance. If you want to test SOS, sign up for a free [personal trial](#), or contact [science-of-synthesis@thieme.de](mailto:science-of-synthesis@thieme.de) for a trial for the whole institution.

**A**

[Alder-ene reactions \(1\)\\*](#)  
[Alder-ene reactions \(2\)\\*](#)  
[aldol addition](#) \*  
[aldol condensation](#) \*  
[alkyne zipper reaction](#) \*  
[Appel reaction \(alkyl bromides\)](#)  
[Appel reaction \(alkyl chlorides\)](#)  
[Arbuzov reaction](#)  
[Arndt–Eistert reaction](#) \*  
[aza-Cope Mannich rearrangement](#)  
[aza-Henry reaction \(1\)](#)  
[aza-Henry reaction \(2\)](#)  
[aza-Morita–Baylis–Hillman reaction \(1\)\\*](#)  
[aza-Morita–Baylis–Hillman reaction \(2\)\\*](#)  
[aza-oxa-Cope rearrangement](#)  
[azide–alkyne Huisgen cycloaddition](#)  
[aziridination of alkenes \(1\)\\*](#)  
[aziridination of alkenes \(2\)\\*](#)  
[azo coupling](#)

**B**

[Babler–Dauben oxidation](#)  
[Baeyer–Villiger oxidation \(general\)\\*](#)  
[Baeyer–Villiger oxidation \(stereoselective\)\\*](#)  
[Balz–Schiemann reaction](#)  
[Bamberger rearrangement](#) \*  
[Bamford–Stevens reaction](#) \*  
[Barbier alkylation](#)  
[Bartoli indole synthesis](#) \*  
[Barton decarboxylation](#)  
[Barton–McCombie reaction](#) \*  
[Baylis–Hillman reaction \(1\)\\*](#)  
[Baylis–Hillman reaction \(2\)\\*](#)  
[Beckmann rearrangement \(1\)\\*](#)  
[Beckmann rearrangement \(2\)\\*](#)  
[benzoin condensation \(asymmetric\)\\*](#)  
[benzoin condensation \(using NHCs\)](#)

[Bergman cyclization](#)  
[Bestmann–Ohira reagent](#)  
[Bestmann's ylide](#)  
[Betti reaction](#)  
[Biginelli reaction](#) \*  
[Birch reduction \(of arenes\)\\*](#)  
[Birch reduction \(of hetarenes\)](#)  
[Bischler indole synthesis](#) \*  
[Bischler–Napieralski reaction](#)  
[Blaise reaction](#)  
[Blanc reaction](#)  
[Bohlmann–Rahtz pyridine synthesis](#)  
[boronic acid Mannich reaction](#)  
[Brook rearrangement](#)  
[Brook rearrangement \(applied in domino reactions\)](#)  
[Brown hydroboration](#) \*  
[Bucherer–Bergs hydantoin synthesis \(1\)](#)  
[Bucherer–Bergs hydantoin synthesis \(2\)](#)  
[Büchner–Curtius–Schlotterbeck reaction](#)  
[Buchner ring expansion](#)  
[Buchwald–Hartwig cross-coupling reaction \(1\)\\*](#)  
[Buchwald–Hartwig cross-coupling reaction \(2\)\\*](#)  
[Buchwald–Hartwig cross-coupling reaction \(3\)\\*](#)

**C**

[Cadiot–Chodkiewicz coupling](#)  
[Cannizzaro reaction](#)  
[Carreira alkynylation](#) \*  
[Chan–Lam–Evans coupling \(of alkylamines\)](#)  
[Chan–Lam–Evans coupling \(of arylamines\)](#)  
[Chapman rearrangement](#) \*  
[Chichibabin reaction](#)  
[Chugaev reaction](#) \*  
[Claisen condensation](#)  
[Claisen rearrangement \(1\)\\*](#)  
[Claisen rearrangement \(2\)\\*](#)  
[Clemmensen reduction](#) \*  
[Click chemistry](#) \*

[Collins reagent](#)  
[Collman's reagent](#)  
[Comins' reagent](#)  
[Conia-ene reaction](#)  
[Cope elimination](#)  
[Cope rearrangement \(1\)\\*](#)  
[Cope rearrangement \(2\)\\*](#)  
[Corey–Bakshi–Shibata reduction\\*](#)  
[Corey–Chaykovsky aziridination\\*](#)  
[Corey–Chaykovsky cyclopropanation](#)  
[Corey–Chaykovsky epoxidation\\*](#)  
[Corey–Fuchs reaction](#)  
[Corey–Kim oxidation](#)  
[Corey–Nicolaou lactonization](#)  
[Corey–Winter alkene synthesis](#)  
[cross metathesis](#)  
[cross-coupling reactions](#)  
[cross-enyne metathesis](#)  
[CuAAC click reactions \(1\)\\*](#)  
[CuAAC click reactions \(2\)\\*](#)  
[Curtius rearrangement \(1\)\\*](#)  
[Curtius rearrangement \(2\)\\*](#)  
[cyclopropanations](#)

**D**

[Dakin oxidation](#)  
[Darzens reaction \(1\)](#)  
[Darzens reaction \(2\)](#)  
[Dess–Martin oxidation \(aldehydes\)](#)  
[Dess–Martin oxidation \(ketones\)](#)  
[Dieckmann condensation](#)  
[Diels–Alder reaction\\*](#)  
[Diels–Alder reaction\\*](#)  
[dihydroxylation of alkenes](#)  
[Dimroth rearrangement \(1,2,3-triazoles\)](#)  
[Dimroth rearrangement \(tetrazoles\)](#)  
[Doering–Moore–Skattebøl reaction](#)  
[domino reactions \(table of contents\)](#)

[domino reactions\\*](#)

## E

[Eglinton reaction](#)  
[ene reactions \(1\)\\*](#)  
[ene reactions \(2\)\\*](#)  
[enyne metathesis\\*](#)  
[Eschenmoser–Claisen rearrangement](#)  
[Eschenmoser–Tanabe fragmentation \(1\)](#)  
[Eschenmoser–Tanabe fragmentation \(2\)](#)  
[Evans–Tishchenko reaction](#)

## F

[Favorskii rearrangement](#)  
[Ferrier/Petasis rearrangements](#)  
[Fischer indole synthesis\\*](#)  
[Fischer–Speier esterification](#)  
[Fleming–Tamao Oxidation](#)  
[Friedel–Crafts acylation\\*](#)  
[Friedel–Crafts alkylation](#)  
[Friedlaender quinoline synthesis](#)  
[Fries rearrangement](#)  
[Fukuyama coupling](#)

## G

[Gabriel synthesis\\*](#)  
[Gassman indole synthesis\\*](#)  
[Gattermann reaction](#)  
[Gattermann–Koch reaction](#)  
[Gewald reaction\\*](#)  
[Gilman reagents](#)  
[Glaser coupling\\*](#)  
[glycosylation](#)  
[Grignard reagents](#)

## H

[haloform reaction\\*](#)  
[Hajos–Parrish–Eder–Sauer–Wiechert cyclization](#)  
[Hantsch pyridine synthesis\\*](#)  
[Hay coupling\\*](#)  
[Heck reaction \(table of contents\)](#)

[Heck reaction](#)\*[Henry reaction](#) (zinc catalyzed)[Henry reaction](#)\*[Hiyama coupling](#)\*[Hiyama–Denmark coupling](#)\*[Hofmann elimination](#) (1)\*[Hofmann elimination](#) (2)[Hofmann rearrangement](#)\*[Hofmann–Löffler–Freitag rearrangement](#)[Hosomi–Sakurai reaction](#) (1)[Hosomi–Sakurai reaction](#) (2)[Horner–Emmons reaction](#)[Horner–Wadsworth–Emmons reaction](#)[Hunsdiecker reaction](#)[hydroformylation of alkenes](#) (1)\*[hydroformylation of alkenes](#) (2)\*[hydrogenation of alkenes](#) (asymmetric)**I**[Ireland–Claisen rearrangement](#)\*[Itsuno–Corey reduction](#)**J**[Jacobsen–Katsuki epoxidation](#)\*[Jones oxidation](#) (to give carboxylic acids)\*[Jones oxidation](#) (to give ketones)\*[Julia alkenation](#)\*[Julia–Colonna epoxidation](#)[Julia–Kocienski alkenation](#)**K**[Kabachnik–Fields reaction](#)\*[Kharasch–Sosnovsky allylic oxidation](#)\*[Knoevenagel–Doebner condensation](#)[Knorr pyrazole synthesis](#)[Koenigs–Knorr synthesis](#)[Kolbe electrolysis](#)[Kolbe–Schmitt reaction](#)[Kröhnke pyridine synthesis](#)[Kulinkovich cyclopropanation](#)\*[Kumada coupling](#)**L**[Larock indole synthesis](#)[Leuckart reaction](#)\*[Lossen rearrangement](#)\*[Luche reduction](#)**M**[Mannich reaction](#) (1)\*[Mannich reaction](#) (2)\*[Mannich reaction](#) (enamine catalyzed)\*[Mannich reaction](#) (stereoselective)\*[McMurry coupling](#)[Meerwein arylation](#)[Meerwein–Ponndorf–Verley reduction](#) (aldehyde reduction)\*[Meerwein–Ponndorf–Verley reduction](#) (ketone reductions)[Meyer–Shuster rearrangement](#)[Michaelis–Arbuzov reaction](#)[Mislow–Evans rearrangement](#)[Miyaura borylation reaction](#)\*[Mizoroki–Heck reaction](#)\*[Morita–Baylis–Hillman reaction](#) (1)\*[Morita–Baylis–Hillman reaction](#) (2)\*[Mukaiyama aldol reaction](#)[multicomponent reactions](#)**N**[Nazarov cyclization](#)\*[Neber rearrangement](#)\*[Nef reaction](#) (to give ketones)[Negishi coupling](#) (table of contents)\*[Negishi coupling](#) (alkenylzinc compounds)[Negishi coupling](#) (arylzinc compounds)[Nenitzescu indole synthesis](#)\*[Newman–Quart rearrangement \(to S-aryl thiocarbamates\)](#)[Newman–Quart rearrangement](#) (to thiophenols)[N-heterocyclic carbenes \(in catalysis\)](#)\*

[Nicholas reaction](#)

[nitro aldol reaction](#) (general)\*

[nitro aldol reaction](#) (stereoselective)

[Nozaki–Hiyama–Kishi coupling](#)\*

[Nozaki–Hiyama–Kishi coupling](#) (stereoselective)\*

[Nozaki–Hiyama–Kishi coupling](#) (intramolecular)\*

[Nysted reagent](#)

## O

[Ohia–Bestmann reagent](#)

[Oppenauer oxidation](#)\*

[Overman rearrangement](#)\*

[oxy-Cope rearrangement](#)

[ozonolysis](#) (to give alcohols)

[ozonolysis](#) (to give aldehydes)\*

[ozonolysis](#) (to give ketones)

## P

[Paal–Knorr furan synthesis](#)

[Paal–Knorr pyrrole synthesis](#)

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[Paternò–Büchi photocycloaddition](#)

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[Peterson alkenation](#)\*

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[Pictet–Spengler reaction](#)\*

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[Prévost–Woodward dihydroxylation](#)

[Prins reaction](#)

[Prins–pinacol rearrangement](#)

## R

[Ramberg–Bäcklund rearrangement](#)\*

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[reductive amination](#) (stereoselective)

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[Reimer–Tiemann reaction](#)

[Riley oxidation](#) (of aldehydes)

[Riley oxidation](#) (of ketones)

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[ring-closing metathesis \(RCM\)](#)\*

[ring-opening metathesis polymerization \(ROMP\)](#)\*

[Ritter reaction](#)

[Robinson annulation](#)

[Rosenmund reduction](#)

[Rosenmund–von Braun reaction](#)

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[Rupe rearrangement](#)

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[Sakurai reaction \(1\)](#)

[Sakurai reaction \(2\)](#)

[Schiemann reaction](#)

[Schlosser–Lochmann bases](#)

[Schlosser modification](#)

[Schmidt reaction](#) (to give amines)

[Schmidt reaction](#) (to give amides)

[Schwesinger bases](#)\*

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[Still–Gennari olefination](#)

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[Suzuki coupling](#) (table of contents)\*

[Suzuki coupling](#)\*

[Swern oxidation](#) (to give aldehydes)\*

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## T

[Tamao–Fleming Oxidation](#)

[Tamao–Kumada Oxidation](#)

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[Tishchenko reaction](#)

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[trifluoromethylation reactions](#)

[Tschitschibabin reaction](#)

## U

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[Ullmann reaction](#)\*

[Upjohn dihydroxylation](#)

## V

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## W

[Wacker process](#)

[Wacker–Tsuji oxidation](#)\*

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[Wittig–Horner reaction](#) (*E*-selective)

[Wittig–Horner reaction](#) (*Z*-selective)

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[\[2,3\]-Wittig rearrangement](#) (1)

[\[2,3\]-Wittig rearrangement](#) (2)

[Wittig–Still rearrangement](#)

[Wohl–Ziegler bromination](#)

[Wolff rearrangement](#)\*

[Wolff–Kishner reduction](#)\*

[Woodward \*cis\*-dihydroxylation](#)

## Y

[Yamaguchi esterification \(macrolactones\)](#)

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[Ziegler–Natta catalysts](#)